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Response to Office Action Dated 11/16/2006

In the Claims

1
2 1. (Currently Amended) A fuel cell system, configured to control temperature
3 by regulating serial vs. parallel configuration of fuel cells within the system, the
4 system comprising:

5 a first and second fuel cells capable of providing an electrical output; and

6 a second fuel cell capable of providing an electrical output; and

7 a controller configured for regulating temperature of the fuel cell system by
8 controlling serial vs. parallel configuration of the first and second fuel cells,
9 wherein the controller is configured to identify whether more or less heat is
10 required, and wherein the controller is in communication with:

11 a switch circuit ~~that includes~~ comprising one or more switches for
12 arranging the electrical output of the first fuel cell and the electrical output of the
13 second fuel cell in parallel or series; and

14 a temperature measurement circuit capable of measuring the
15 temperature of the first fuel cell or the second fuel cell and providing a signal to
16 the ~~switch circuit to thereby adjust electrical output efficiency and heat~~
17 ~~production~~ controller;

18 wherein the controller utilizes the switch circuit to switch to a more serial
19 configuration if more heat is required and switches to a more parallel
20 configuration if less heat is required.

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22 2. (Canceled)
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1 3. (Original) The system of claim 1, wherein the first fuel cell and the second
2 fuel cell comprises solid oxide fuel cells.

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4 4. (Currently Amended) The system of claim 1, ~~further comprising a~~wherein
5 the controller to control the switch circuit increases heat production by increasing
6 fuel consumption by switching to a more serial configuration and decreases heat
7 production by decreasing fuel consumption by switching to a more parallel
8 configuration.

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10 5. (Previously Presented) The system of claim 4, wherein the controller is
11 configured to receive the signal from the temperature measurement circuit and to
12 arrange the electrical output of the first fuel cell and the electrical output of the
13 second fuel cell in response thereto.

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15 6. (Original) The system of claim 4, wherein the controller causes the switch
16 circuit to arrange the electrical output of the first fuel cell and the electrical output
17 of the second fuel cell in parallel to increase electrical output efficiency of the first
18 fuel cell and the second fuel cell.

19
20 7. (Original) The system of claim 4, wherein the controller causes the switch
21 circuit to arrange the electrical output of the first fuel cell and the electrical output
22 of the second fuel cell in series to decrease electrical output efficiency of the first
23 fuel cell and the second fuel cell.

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1 8.—23. (Cancelled)

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3 24. (Previously Presented) A fuel cell system comprising:

4 means for supplying an excess amount of fuel to a multiple fuel cell
5 system;

6 means for switching at least some of the fuel cells from a parallel electrical
7 arrangement to a series electrical arrangement; and

8 means for producing heat from at least some of the excess amount of fuel.
9

10 25. (Previously Presented) A fuel cell system comprising:

11 means for supplying a substantially constant amount of fuel to a multiple
12 fuel cell system;

13 means for switching at least some of the fuel cells from a series electrical
14 arrangement to a parallel electrical arrangement;

15 means for increasing EMF efficiency; and

16 means for reducing fuel efficiency.
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18 26. (Cancelled)

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20 27. (Cancelled)
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1 28. (New) A fuel cell system, configured to control temperature by regulating a
2 serial vs. a parallel configuration of cells within the system, the fuel cell system
3 comprising:

4 a controller configured to identify whether more or less heat is required by
5 the fuel cell system, and to increase or decrease heat provided to the fuel cell
6 system by regulating a serial vs. a parallel configuration of cells within the system;

7 a temperature measurement circuit, in communication with the controller,
8 configured to measure temperature of at least one fuel cell and to provide a signal
9 to the controller; and

10 a switching circuit to arrange the first and second fuel cells in a parallel or a
11 series configuration in response to the controller;

12 wherein the controller utilizes the switching circuit to switch to a more
13 serial configuration if more heat is required and to switch to a more parallel
14 configuration if less heat is required.

15
16 29. (New) The fuel cell system of Claim 28, wherein the controller alternates
17 between increased heat production associated with a more serial configuration of
18 the cells within the system and decreased heat production associated with a more
19 parallel configuration of the cells within the system to provide fuel cell modulation
20 and temperature control to the fuel cell system.

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22 30. (New) The fuel cell system of Claim 28, wherein the controller directs an
23 excess supply of fuel to the system prior to identification of heat requirements of
24 the fuel cells.
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2 31. (New) The fuel cell system of Claim 28, wherein the controller iteratively
3 measures fuel cell temperatures and iteratively reconfigures the fuel cell system in
4 a more parallel or more serial configuration in response to temperature changes.
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6 32. (New) The fuel cell system of Claim 28, wherein the controller is
7 configured to supply an excess amount of fuel to multiple fuel cells, to receive a
8 temperature measurement from the temperature measurement circuit, to switch at
9 least some of the fuel cells from a parallel electrical arrangement to a series
10 electrical arrangement using the switching circuit in response to the measured
11 temperature, and to thereby produce heat from at least some of the excess amount
12 of fuel.
13

14 33. (New) The fuel cell system of Claim 28, wherein the controller is
15 configured to supply an excess amount of fuel to multiple fuel cells, to switch at
16 least some of the fuel cells from a parallel electrical arrangement to a series
17 electrical arrangement, and to produce heat from at least some of the excess
18 amount of fuel.
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1 34. (New) A fuel cell system, configured to alternate between serial vs. parallel
2 configurations of fuel cells within the system based on heat required by the
3 system, the fuel cell system comprising:

4 means for controlling the fuel cell system, wherein the means for
5 controlling is configured to identify whether more or less heat is required by the
6 fuel cell system;

7 means for measuring temperature within one or more fuel cells and for
8 communicating with the means for controlling the fuel cell; and

9 means for switching the fuel cells between a parallel configuration and a
10 serial configuration, in response to direction from the means for controlling the
11 fuel cell;

12 wherein the means for controlling the fuel cell utilizes the means for
13 switching to switch the fuel cell system to a more serial configuration if more heat
14 is required and to switch the fuel cell system to a more parallel configuration if
15 less heat is required.

16
17 35. (New) The fuel cell system of Claim 34, wherein the means for controlling
18 is configured to switch fuel cells from a series electrical arrangement to a parallel
19 electrical arrangement to increase EMF efficiency and reduce fuel efficiency.

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21 36. (New) The fuel cell system of Claim 34, wherein the fuel cells within the
22 system comprise solid oxide fuel cells.
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1 37. (New) The fuel cell system of Claim 34, wherein the means for controlling
2 iteratively receives fuel cell temperature measurements and iteratively
3 reconfigures the fuel cell system in a more parallel or more serial configuration in
4 response to temperature changes.

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6 38. (New) The fuel cell system of Claim 34, wherein the means for controlling
7 is configured to supply an excess amount of fuel to multiple fuel cells, to receive a
8 temperature measurement from the temperature measurement circuit, to switch at
9 least some of the fuel cells from a parallel electrical arrangement to a series
10 electrical arrangement using the switching circuit, and to thereby obtain heat from
11 at least some of the excess amount of fuel.

12
13 39. (New) The fuel cell system of Claim 34, wherein the means for controlling
14 is configured to supply a substantially constant amount of fuel to multiple cells
15 within the fuel cell system, to switch at least some of the fuel cells from a series
16 electrical arrangement to a parallel electrical arrangement, and to thereby increase
17 EMF efficiency and reduce fuel efficiency.

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1 40. (New) A fuel cell system, configured to regulate temperature by alternating
2 between increased and decreased heat production, the fuel cell system comprising:
3 a temperature measurement circuit configured to measure temperature of
4 fuel cells within the system;
5 a switching circuit to change an arrangement of the fuel cells in either
6 direction between a parallel configuration and a serial configuration; and
7 a controller configured to receive temperature measurement information
8 from the temperature measurement circuit, to determine whether more or less heat
9 is required by the fuel cell system, and to control the switching circuit and the
10 configuration of the fuel cells, wherein the controller utilizes the switching circuit
11 to switch to a more serial configuration if more heat is required and to switch to a
12 more parallel configuration if less heat is required.

13
14 41. (New) The fuel cell system of Claim 40, wherein the controller is
15 configured to switch fuel cells from a series electrical arrangement to a parallel
16 electrical arrangement to increase EMF efficiency and reduce fuel efficiency.

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18 42. (New) The fuel cell system of Claim 40, wherein the controller is
19 configured to switch fuel cells between a series electrical arrangement that
20 increases fuel consumption and heat production and a parallel electrical
21 arrangement that decreases fuel consumption and heat production.

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1 43. (New) The fuel cell system of Claim 40, wherein the controller iterates in a
2 cycle of measuring fuel cell temperatures and reconfiguring the fuel cell system in
3 a more parallel or more serial configuration in response to temperature changes.
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5 44. (New) The fuel cell system of Claim 40, wherein the controller is
6 configured to supply an excess amount of fuel to multiple fuel cells, to switch at
7 least some of the fuel cells from a parallel electrical arrangement to a series
8 electrical arrangement using the switching circuit, and to thereby produce heat
9 from at least some of the excess amount of fuel.
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11 45. (New) The fuel cell system of Claim 40, wherein the controller is
12 configured to supply a substantially constant amount of fuel to multiple cells
13 within the fuel cell system, to switch at least some of the fuel cells from a series
14 electrical arrangement to a parallel electrical arrangement, and to thereby increase
15 EMF efficiency and reduce fuel efficiency.
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